BRNO 04/29.4.14

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Building & Highway Material Testing Laboratory

NABL - Accredited Laboratory as per ISO / IEC - 17025 : 2005

Job No.: CTCE/BBMP/W.No.08/KNR/WMM/Gradation/2013-14 06.03.2014

GRADATION FOR WMM
MORTH TABLE-400-11

Client : **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.

Agency : **Mr.K. Narasimharaju,** Contractor, Bangalore.

Name of Work : Improvements to Roads and Drain at Bhadrappa Layout Marutinagara in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore.

Reference : AEE/KH/(WO)/235/2013-14 Dated: 03.03.2014

Date of Testing : 05.03.2014

Material : WMM

Sample Location : WMM Mix Plant Oven Dry Wt (gm): 26400

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec. Limits
53	0	0	0	100	100
45	995	995	3.8	96.2	95-100
22.4	6905	7900	29.9	70.1	60-80
11.2	5520	13420	50.8	49.2	40-60
4.75	4005	17425	66.0	34.0	25-40
2.36	3790	21215	80.4	19.6	15-30
0.600	2595	23810	90.2	9.8	8-22
0.075	2305	26115	98.9	1.1	0-8

Note:

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AE 08

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Job No.: CTCE/BBMP/W.No.08/KNR/SDBC/Bitumen/2013-14 13.03.2014

BITUMEN CONTENT AND GRADATION DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

AASHTO T 164 & AASHTO T 30

CLIENT	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
AGENCY	**Mr.K. Narasimharaju,** Contractor, Bangalore.
NAME OF THE WORK	Improvements to Roads and Drain at Bhadrappa Layout Marutinagara in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore.
REFERENCE	AEE/KH/(WO)/235/2013-14 Dated: 03.03.2014
SAMPLE I/D	Roads and Drain at Bhadrappa Layout Marutinagara in Ward No.08
DATE OF TESTING	13.03.2014

BITUMEN CONTENT DETERMINATION

Description	Trail 1	Trail 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	473.5	478.5
3. Weight of Asphalt and Mineral matter Extracted,	-	-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	26.5	21.50
7. Bitumen content in %	5.30	4.30
8. Average	4.80	

GRADATION AFTER EXTRACTION

SIEVE SIZE	Trail 1				JOBMIX
mm	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	Gradation
13.2	0	0	0	100	100
9.5	24.56	5.19	5.19	94.81	90-100
4.75	251.8	53.18	58.37	41.63	35-51
2.36	59.33	12.53	70.90	29.10	24-39
1.18	46.32	9.78	80.68	19.32	15-30
0.3	45.89	9.69	90.37	9.63	9-19
0.075	31.65	6.68	97.05	2.95	3-8

SIEVE SIZE	Trail 2				JOBMIX
mm	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	Gradation
13.2	0	0	0	100	100
9.5	28.35	5.67	5.67	94.33	90-100
4.75	249.5	49.90	55.57	44.43	35-51
2.36	94.56	18.91	74.48	25.52	24-39
1.18	52.35	10.47	84.95	15.05	15-30
0.3	29.88	5.98	90.93	9.07	9-19
0.075	22.98	4.60	95.52	4.48	3-8

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Job No.: CTCE/BBMP/W.No.08/KNR/AIV/2013-14 05.03.2014

Aggregate Impact Value

IS: 2386 Part IV

Client	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr.K. Narasimharaju,** Contractor, Bangalore.
Name of the Work	Improvements to Roads and Drain at Bhadrappa Layout Marutinagara in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore.
Reference	AEE/KH/(WO)/235/2013-14 Dated: 03.03.2014
Source / Location	WMM Plant
Type of Mix	Wet Mix macadam
Date of Testing	05.03.2014

Sl No.	Details	Trial No.		Average
		1	2	
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	389	390	
2	Weight of aggregate passing 2.36 mm sieve after the test = W_2 g	88	89	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	301	301	
4	Aggregate Impact value = percent fines	22.62	22.82	
	100* (W_2/W_1)%			22.72

Comments:

→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%

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Job No.: CTCE/BBMP/W.No.08/KNR/WMM/S-T/2013-14 05.03.2014

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr.K. Narasimharaju,** Contractor, Bangalore.
Name of Work	Improvements to Roads and Drain at Bhadrappa Layout Marutinagara in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore.
Reference	AEE/KH/(WO)/235/2013-14 Dated: 03.03.2014
Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Date of Testing	05.03.2014

Result :- Flakiness Index = **11.26%**

Elongation Index = **13.25%**

Result : Combined Flakiness & Elongation index **24.51%**

Comments:

Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

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Job No.: CTCE/BBMP/W.No.08/KNR/SDBC/AIV/2013-14 13.03.2014

Aggregate Impact Value

IS: 2386 Part IV

Client	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr.K. Narasimharaju,** Contractor, Bangalore.
Name of the Work	Improvements to Roads and Drain at Bhadrappa Layout Marutinagara in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore.
Reference	AEE/KH/(WO)/235/2013-14 Dated: 03.03.2014
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	13.03.2014

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	389	390	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	88	89	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	301	301	
4	Aggregate Impact value = percent fines 100* (W_2/W_1)%	22.62	22.82	22.72

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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Job No.: CTCE/BBMP/W.No.08/KNR/SDBC/Shape_T/2013-14 : 13.03.2014

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	: **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	: **Mr.K. Narasimharaju,** Contractor, Bangalore.
Name of Work	: Improvements to Roads and Drain at Bhadrappa Layout Marutinagara in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore.
Reference	: AEE/KH/(WO)/235/2013-14 Dated: 03.03.2014
Technical Reference	: IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	: Semi Dense Bituminous Concrete
Date of Testing	: 13.03.2014

Result : Flakiness Index = **11.26%**

Elongation Index = **13.25%**

Result : Combined Flakiness & Elongation index **24.51%**

Comments:

Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/W.No.08/KNR/SDBC/Stripping/2013-14 13.03.2014

Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

Client	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr.K. Narasimharaju,** Contractor, Bangalore.
Name of the work	Improvements to Roads and Drain at Bhadrappa Layout Marutinagara in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore.
Reference	AEE/KH/(WO)/235/2013-14 Dated: 03.03.2014
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	13.03.2014

Type of binder : 60/70
Percentage of binder used : 5.0% by wt.
Total weight of aggregate : 200 g
Total weight of binder : 10.0 g
Temperature of water-bath : 40° C

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	3.1	3.20	96.80
2	3.2		
3	3.3		

Comments:

→ Minimum allowable Aggregate retained coating for Semi Dense Bituminous Concrete is 95%

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Job No.: CTCE/BBMP/W.No.08/KNR/SDBC/Sp_Wa/2013-14 13.03.2014

Specific Gravity And Water Absorption Test

IS: 2386 Part III

Client	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr.K. Narasimharaju,** Contractor, Bangalore.
Name of the Work	Improvements to Roads and Drain at Bhadrappa Layout Marutinagara in Ward No.08, Kodigehalli Sub Division, BBMP, Bangalore.
Reference	AEE/KH/(WO)/235/2013-14 Dated: 03.03.2014
Type of Mix	Semi Dense Bituminous Concrete
Source / Location	Hotmix Plant, Bangalore
Date of Testing	13.03.2014

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	2025	2023	2024	
2	Weight of basket suspended in water	W_2 g	755	755	755	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1270	1268	1269	
4	Weight of saturated surface dry aggregate in air	W_3 g	2028	2032	2021	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	758	764	752	
6	Weight of oven dried aggregate	W_4 g	2005	2006	2007	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.645	2.626	2.669	2.647
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.728	2.718	2.720	2.722
9	Water Absorption	$((W_3-W_4)*100)/W_4$	1.15%	1.30%	0.70%	1.05%

Comments:

→ Maximum allowable Aggregate Water absorption value for Semi Dense Bituminous Concrete is 2.0%

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